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Environment, Safety, and Health

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Part 13: Biological

13.3 Sanitation

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Recommended for approval by the ES&H Working Group

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New document or new requirements

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Sanitation*
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* **Minor revision**

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Sanitation

1.0 Introduction

Sanitation is defined as the measures, methods, and activities that prevent the transmission of diseases and benefit workers and public health. This document describes the hygienic principles, operations, and maintenance services that are used at LLNL to prevent the spread of infectious and parasitic diseases and exposure to contaminants in drinking water and food.

All factors related to preventing the spread of diseases in water and food in LLNL-controlled areas shall conform to applicable regulations and standards of the Code of Federal Regulations (CFR), California Health and Safety Code, and California Code of Regulations (CCR). Unsatisfactory conditions shall be corrected before they become a health hazard.

2.0 Hazards

Microorganisms, also called microbes, are present in our environment, in soil, air, water, and food. Inadequate sanitation gives rise to infectious and parasitic diseases. Exposures to pathogenic organisms and toxic substances can lead to illness among employees. For example, if a laboratory food service fails to supply sanitary food-handling facilities and practices, the potential exists for widespread food-borne infection by harmful organisms and their toxins or by other poisonous materials.

Microbial pathogens or biological contaminants in drinking water and food are responsible for various gastrointestinal illnesses.

LLNL maintenance workers perform sewage sampling, sewer diversions, cleaning and repair of broken service lines, and repair of building sanitary sewage systems and functions related to operations of the sewer diversion facility and maintenance of sanitary sewage treatment pond facilities. The hazards involved in these activities result from possible exposure to raw sewage and the associated microbes or hazardous gases such as hydrogen sulfide, methane, carbon dioxide, and ammonia produced from the biodegradation of the sewage.

The evaluation of sanitation in the workplace involves an understanding of the potential media for contamination such as water, food, waste, personal-services facilities (lockers, washrooms, and restrooms), and pests and vermin.

3.0 Controls

In each of the following sections, microbial hazards associated with each area of concern are discussed along with examples of good practices or controls for avoiding or minimizing the risks of such hazards.

All active LLNL workplaces shall be maintained in a sanitary condition and shall be constructed, equipped, and maintained in a sanitary condition so far as reasonably practicable—to prevent the habitation of rodents, insects, and vermin of any kind that may harbor microbes. General guidelines for the construction and maintenance of toilet and washing facilities, changing rooms, and lunch rooms, including ventilation requirements, are found in 29 CFR 1910 Subpart J, General Environmental Controls, and 29 CFR 1910.141(a)(5), "Sanitation, general, vermin control."

3.1 Water

Drinking water used at LLNL shall conform with the appropriate sections of 40 CFR 141, "National Primary Drinking Water Regulations" and 22 CCR §§ 64400-64501. The San Francisco Public Utilities District analyzes LLNL's Hetch Hetchy water supply for "maximum contaminant levels" according to these regulations. In addition to these analyses, LLNL's Plant Engineering Department collects weekly water samples at representative points around the site to test for bacteria total plate count, fecal coliform, trihalomethane, lead, copper, and residual chlorine levels. LLNL also purchases water from Zone 7 of the Alameda County Flood Control and Water Conservation District as a standby or backup supply to the Hetch Hetchy water system. As a water consumer, LLNL does not treat its water, but LLNL must be assured by the water purveyor that the water never has any impurities in concentrations that would either be hazardous or offensively affect the senses (turbidity, color, taste, or smell).

Water at Site 300 is not supplied by an outside purveyor, but is obtained from well waters; therefore, LLNL, as a consumer and supplier, follows drinking-water regulations that ensure quality as good as or better than that found in 40 CFR 141 and 22 CCR. Plant Engineering monitors at least monthly for various physical, chemical, and biological contaminants and submits a monthly report to the state of California. Site 300 water is chlorinated by the Plant Engineering Department, which monitors residual chlorine concentrations weekly.

The drinking-water supply system shall be installed in accordance with the Uniform Plumbing Code and maintained in good condition. Before installing or repairing drinking-water pipe systems, contact the Plant Engineering Department's Mechanical Utilities for assistance.

An adequate supply of potable water should be available within 61 m (200 ft) of any location where employees are regularly engaged in work. Temporary buildings with five or more connected trailer units should be equipped with piped potable water and a drain to the sanitary sewer. Temporary buildings with fewer than five units may use approved bottled-water dispensers. Water fountains and bottled-water dispensers should conform to Standard S-1010-94, "Drinking Fountains and Self-Contained, Mechanically Refrigerated Drinking-Water Coolers" of the Air Conditioning and Refrigeration Institute, and 21 CFR 165.110, "Bottled Water."

Work supervisors are responsible for ensuring that bottled-water dispensers are kept in sanitary condition in their work area. Improper storage of bottled water such as leaving water bottles in the sun and inadequate cleaning and disinfection of water dispensers can result in significant algae growth, undesirable levels of bacteria causing taste and odor problems. Bottles should be stored out of direct sun in a cool, dark place. Users should clean and disinfect water dispensers at 3- to 4-month intervals, or when a noticeable taste or odor problem exists. To distinguish between potable and nonpotable water (deionized, distilled, or low-conductivity), distinctly mark all water lines to indicate the type of water flowing through them. Label outlets for nonpotable water to indicate that the water is not to be used for drinking, washing, or cooking purposes. The ES&H Team can provide assistance in obtaining proper labels.

The programs or directorates responsible for the operation of cooling towers, evaporative coolers, swamp coolers, and equivalent water-handling equipment contract with Mechanical Utility, Maintenance & Operation, or vendors to maintain the proper concentration of bactericides in the water within these systems.

Cross-Connection Control and Backflow Prevention. The reverse flow of contaminated water into the potable water system through unprotected cross-connections can cause sewage contamination of the water supply. To ensure safe potable water systems, the Plant Engineering Department gives special attention to each branch of the potable water supply to eliminate the danger of reverse flow. The Plant Engineering Standard (PEL-M-02676), "Backflow Prevention in Potable Water Systems," establishes acceptable design practices, backflow-prevention devices, testing, and administrative controls to be used for all potable water supply branches at LLNL. LLNL's cross-connection control program also follows American Water Works Association Standards (AWWA M14 and C506-69) and 17 CCR §§ 7601-7605 "Protection of Water Systems."

3.2 Food

Commercial/Cafeteria. Food preparation, serving, and storage shall comply with the U.S. Dept of Health and Human Services, Public Health Service, Food and Drug Administration, Food Code, 1997. Each food facility or multiple food facilities permitted

within the same site and under the same management shall have an owner or worker who has successfully passed an approved and accredited food safety certification examination. Hand-washing signs shall be posted at hand-washing stations and in restrooms. Where applicable, all food-service equipment should be certified by the National Sanitation Foundation. The Hazards Control Department conducts semiannual cafeteria inspections to ensure that LLNL's food-service management contractor is complying with this code. To prevent the growth of harmful bacteria, perishable food and beverages are stored below 5^0C (41^0F); and foods are heated above 60^0C (140^0F) during the serving period.

Commercial. Foods and beverages shall be prepared, stored, displayed, transported, and served so they are protected from dust, insects, rodents, unnecessary handling, airborne droplets, and overhead leakage.

Receptacles constructed of smooth, corrosion-resistant, easily cleanable, or disposable materials with solid tight-fitting covers shall be used for the disposal of food. They shall be emptied at least once each working day, unless unused, and shall be kept in a clean and sanitary condition.

Lunchroom. All vending machines at LLNL, where applicable, should be certified by the National Automatic Merchandising Association. Food shall be stored in refrigerators and heated in microwave ovens designated for that purpose only. Refrigerators and microwave ovens are maintained in a clean and sanitary condition. Food shall not be eaten or stored in areas where toxic or biological materials are handled or stored. Report suspected or alleged cases of food poisoning to the Hazards Control Department for immediate investigation.

3.3 Waste

All sanitary sewage shall be released from LLNL-controlled areas into sanitary-sewer lines or to other proper disposal channels. Hazardous materials must not be discarded into the sanitary-sewer system, storm-sewer system, or domestic waste-collection system.

The Environmental Protection Department continually surveys the sanitary sewer effluent that leaves LLNL and periodically samples the effluent from the storm sewers. Drainage that flows through storm sewers and drainage ditches must conform with the water discharge quality standards of the U.S. Environmental Protection Agency. See Document 32.1, "Management and Maintenance of Water Quality," in the *ES&H Manual* for details.

Food and beverage waste, such as garbage and trash, should be collected daily, accumulated outside buildings in closed containers, and promptly removed from the premises. Any solid or liquid waste receptacle shall be constructed so it does not leak and may be thoroughly cleaned and maintained in a sanitary condition.

Working with Raw Sewage. LLNL workers who handle raw sewage are required to follow Plant Engineering's OSP No. L-70, "Working with Raw Sewage at LLNL."

3.4 Personal Services Facilities (Locker Rooms, Washrooms, Restrooms)

Adequate personal service facilities such as locker rooms, washrooms, and restrooms (including portable toilets) shall comply with 29 CFR 1910 Subpart J, General Environmental Controls and ANSI Z4.1-1986, "American National Standard for Sanitation in Places of Employment–Minimum Requirements." Where workers are exposed to skin contamination with toxic, infectious, or irritating material, or where hot, wet, or dirty conditions require showering before leaving the job, facilities shall be provided in changing rooms so that street and work clothing will not be in contact with each other and showers will be provided. See 29 CFR 1910, Subpart Z, for laundering clothing contaminated with materials covered by substance specific requirements.

3.5 Pests and Vermin

An insect- and rodent-abatement program shall be maintained by Plant Engineering's Facilities Maintenance and Operations Division. However, the ES&H Team shall be informed of the pesticides being used. See

http://www.cdc.gov/ncidod/diseases/hanta/hantvrus.htm

for information on Hantavirus Pulmonary Syndrome.

4.0 Responsibilities

This section describes the responsibilities of personnel to prevent the transmission of infectious, parasitic diseases and exposure to biological contaminants in water and food. General responsibilities for all workers are described in Document 2.1, "Laboratory ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual*.

Achieving the objectives of this document requires the coordination of various departments, groups, and individuals and the approval of the Responsible Individual.

4.1 Responsible Individual/Facility Manager or Facility Point of Contact

- Ensures that sufficient time is allocated for proper design and review of designs by the Plant Engineering and Hazards Control Departments.
- Supports the planning of new systems and modifications to existing systems on an informal basis with Plant Engineering and Hazards Control.
- Allocates sufficient funds to ensure that systems comply with codes/standards and prevent the development of hazards/significant nuisances.

4.2 Hazards Control Department

ES&H Teams

- Support and formally review the planning of new plumbing, the installation of food-service equipment and water-distribution systems, and the modifications to existing systems on an informal basis with Plant Engineering and clients.
- Resolve conflicts that may arise between standards and best management practices.
- Check new installations of food-service equipment and water-distribution systems for compliance with performance specifications and sanitation.
- Conduct semi-annual inspections.

Safety Programs Division

- Provides current guidance on standards and good practices for sanitation requirements to the ES&H Teams.

4.3 Plant Engineering Department

- Coordinates the planning of new sanitation and the installation of food-service equipment and water-distribution systems and modifications of existing systems with the client and appropriate members of the ES&H Teams early in the design phase.
- Routes plans through the ES&H Teams for review before contracts are let.
- Ensures that systems are designed in accordance with mandatory requirements and provisions of best management practices specified by the references in this document.
- Maintains awareness of general sanitation conditions in buildings.

- Corrects problems found during inspections within a reasonable time.
- Maintains institutional cooling towers and those contracted with programs.
- Monitors Site 300 water monthly.

4.4 Environmental Protection Department

The Operations and Regulatory Affairs Division of the Environmental Protection Department provides information and requirements concerning pollution prevention, waste minimization, effluent treatment, and National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) documentation.

4.5 Business Services Department

Ensures that the bottled water and food-services subcontractor's systems and practices comply with the codes and standards outlined in the food-services subcontract and in this document.

4.6 Health Services Department

- Provides health services following potential exposure to pathogens and environmental contaminants.

5.0 Work Standards

17 CCR, §§ 7601-7605, Protection of Water system.

22 CCR, §§ 64001-64260, Water Permits (Primary and Secondary MCLs).

22 CCR, §§ 64400-64501, Domestic Water Quality and Monitoring Regulations.

22 CCR, §§ 64551 – 64644, California Waterworks Standards.

22 CCR, §§ 64650- 64692 , Surface Water Treatment.

29 CFR 1910 Subpart J, General Environmental Controls.

29 CFR 1910.141(a)(5) Sanitation, general, vermin control.

40 CFR 141, National Primary Drinking Water Regulations.

Uniform Plumbing Code, §§ 1002 –1004 (erection, installation, alteration, repair, relocation placement, addition to, use of plumbing systems, cross-connection control).

US Dept of HHS, Public Health Service, FDA Food Code 1997.

6.0 Resources for More Information

6.1 Contacts (link)

6.2 Applicable Lessons Learned

6.3 Other References

17 CCR §7861, Bottled Water & Water Vending Machines.

21 CFR165.110, "Bottled Water".

Air-Conditioning and Refrigeration Institute (ARI) S-1010-94, "Drinking Fountains and Self-Contained, Mechanically Refrigerated Drinking-Water Coolers".

American Water Works Association Standards M14 and C506-69, Recommended Standard for Back-flow Prevention.

ANSI Z4.1-1986, "American National Standard for Sanitation in Places of Employment—Minimum Requirements".

California Health & Safety Code §§ 113700 - 113733, "California Uniform Retail Food Facilities Law".

National Automatic Merchandising Association, Publication M-6, "Standard for the Sanitary Design and Construction of Food and Beverages Vending Machines (1995) Plant Engineering OSP No. L-70, "Working with Raw Sewage at LLNL".

Plant Engineering Standard (PEL-M-02676), "Backflow Prevention in Potable Water Systems".